

## ABSTRACT

An amplifier-enhanced optical analysis system and method to optically analyze a molecular component of a gas, liquid, or solid. The amplifier-enhanced optical system comprises a laser, a light amplifier, and an optical analysis means, all optically coupled so that light at a predetermined wavelength in the near-infrared spectrum is transported from the laser, through the light amplifier, and to the optical analysis means, wherein the predetermined wavelength corresponds to an absorption feature of the molecular component. Optical analysis means preferably comprises photoacoustic analysis equipment.